

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listings of Claims:

Claims 1-8: (canceled)

Claim 9: (previously presented) A method of forming a titanium layer on a substrate, the method comprising:

placing the substrate in a deposition chamber comprising a titanium sputtering target; and

after placing the substrate in the deposition chamber, introducing a quantity of hydrogen into the deposition chamber without providing power to the titanium sputtering target; and

sputter depositing the titanium target onto the substrate by physical vapor deposition of the titanium sputtering target by applying power to the titanium sputtering target under conditions wherein the atmosphere in the deposition chamber comprises hydrogen and wherein the hydrogen is activated, whereby the titanium layer has a preferred crystal orientation.

Claim 10: (previously presented) The method of Claim 9 wherein introducing a quantity of hydrogen comprises flowing a gas comprising hydrogen into the deposition chamber.

Claim 11: (previously presented) A method of forming a titanium layer on a substrate, the method comprising:

placing the substrate in a sputtering chamber comprising a titanium target;
flowing a first gas comprising hydrogen into the sputtering chamber through a first gas injector;

terminating the flow of the first gas; and

after the flow of the first gas has been terminated, sputter depositing the titanium layer onto the substrate by applying power to the target and by providing a second gas in the sputtering chamber through a second gas injector, wherein the

hydrogen is activated and whereby the deposited titanium layer has a preferred crystal orientation.

Claim 12: (original) The method of Claim 11 wherein the first gas comprises argon and hydrogen.

Claim 13: (original) The method of Claim 12 wherein the second gas is an inert gas.

Claim 14: (original) The method of Claim 12 wherein the first gas injector is positioned proximate the target.

Claim 15: (original) The method of Claim 14 wherein the titanium target is planar and wherein flowing the first gas provides a quantity of hydrogen in the sputtering chamber that is at least 0.5×10^{-4} standard cubic centimeters of hydrogen per square centimeter of target surface area.

Claim 16: (previously presented) The method of Claim 11 wherein applying power to the target comprises providing a power density on the target of at least about 0.5 watt per square centimeter of target area.

Claim 17: (previously presented) The method of Claim 16 wherein applying power to the target comprises providing a power density on the target of between about 3 and about 8 watts per square centimeter of target area.

Claims 18-25: (canceled)

Claim 26: (previously amended) A physical vapor deposition process comprising:

- placing a substrate in a physical vapor deposition chamber, said chamber comprising a titanium target;

- causing hydrogen to be absorbed into the titanium target;

- introducing an inert gas into the chamber;

- igniting a physical vapor deposition plasma in the chamber, said physical vapor deposition plasma causing the hydrogen to be released from the titanium target and to attain a concentration of at least 0.1 molar percent in the chamber, causing the hydrogen to be activated, and causing a titanium layer to be deposited onto the substrate, said titanium layer having a <0002> crystal orientation;

depositing a titanium nitride layer on said titanium layer, said titanium nitride layer having a <111> crystal orientation; and
depositing an aluminum layer on said titanium nitride layer.

Claim 27: (canceled)

Claim 28: (previously presented) The process of Claim 26 wherein said aluminum layer has a <111> crystal orientation.

Claim 29: (previously presented) The process of Claim 26 wherein said hydrogen is absorbed to a depth of about 50 Å into said titanium target.

Claim 30: (previously presented) The process of Claim 26 wherein, after said hydrogen is released from said target, said hydrogen reacts with a species adsorbed in said substrate.

Claim 31: (new) The process of Claim 26 wherein igniting a physical deposition vapor plasma is performed after causing hydrogen to be absorbed into the titanium target.

Claim 32: (new) The process of Claim 26 comprising introducing a flow of hydrogen into the chamber prior to the ignition of the physical vapor deposition plasma.

Claim 33: (new) The process of Claim 32 comprising turning off the flow of hydrogen prior to the ignition of the physical vapor deposition plasma.

Claim 34: (new) The process of Claim 32 comprising introducing at least 0.5×10^{-4} standard cubic centimeters of hydrogen per square centimeter of an area of the titanium target prior to the ignition of the physical vapor deposition plasma.

Claim 35: (new) The process of Claim 26 comprising causing the hydrogen in the chamber to reach a partial pressure in the range of from 3×10^{-5} Torr to 10×10^{-5} Torr prior to the ignition of the physical vapor deposition plasma.

Claim 36: (new) A method of forming a titanium layer on a substrate, the method comprising:

placing the substrate in a physical vapor deposition chamber, the chamber comprising a titanium target;

igniting a plasma in the chamber, thereby causing a titanium layer to be deposited onto the substrate by physical vapor deposition; and

while the plasma is active, flowing a gas comprising hydrogen into the physical vapor deposition chamber, the titanium layer thereby having a <0002> crystal orientation.

Claim 37: (new) The method of Claim 36 wherein a concentration of hydrogen in the chamber hydrogen reaches at least 0.1 molar percent during the physical vapor deposition.

Claim 38: (new) The method of Claim 36 wherein the gas comprises a mixture of argon and hydrogen.

Claim 39: (new) The method of Claim 38 wherein the gas is a molar percentage mixture of from 1% to 4% hydrogen in argon.

Claim 40: (new) The method of Claim 36 wherein flowing a gas comprising hydrogen into the physical vapor deposition chamber comprises flowing hydrogen into the chamber through a first injector, the method further comprising flowing an inert gas into the chamber through a second injector while the plasma is active.

Claim 41: (new) The method of Claim 40 wherein the inert gas is argon.

Claim 42: (new) The method of Claim 36 comprising applying power to the target at a power density of between about 3 and about 8 watts per square centimeter of target area.